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SSC San Diego Approach to Process Improvement

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SPI History

Jan 1988	**SEI assessment: “essentially Level 2”**
May 1988	**Center develops SPI Plan which includes SEPO**
Oct 1988	**SEPO established and resourced**
Nov 1996	**SW Engineering Process Policy Drafted**
Sep 1998	**ISD & NSA assessment: SW-CMM Level 2 and T-CMM Trust Class 2**
Nov 1998	**Official SPI Initiative Kick-off by SSC San Diego Executive Director; changed SEPO focus from “help anyone anytime” to implementing Level 3 capability on Pilot/SPI Projects**
Jan 1999	**DCMC assessment: All Level 2 KPAs and 5 of 7 Level 3 KPAs satisfied**
Jul 2000	**SW Engineering Process Policy Signed**
Oct 2000	**DCMA assessment: SW-CMM Level 3**

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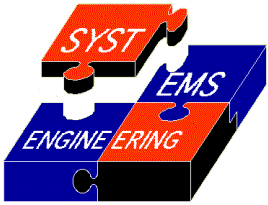
What SSC San Diego is Doing?

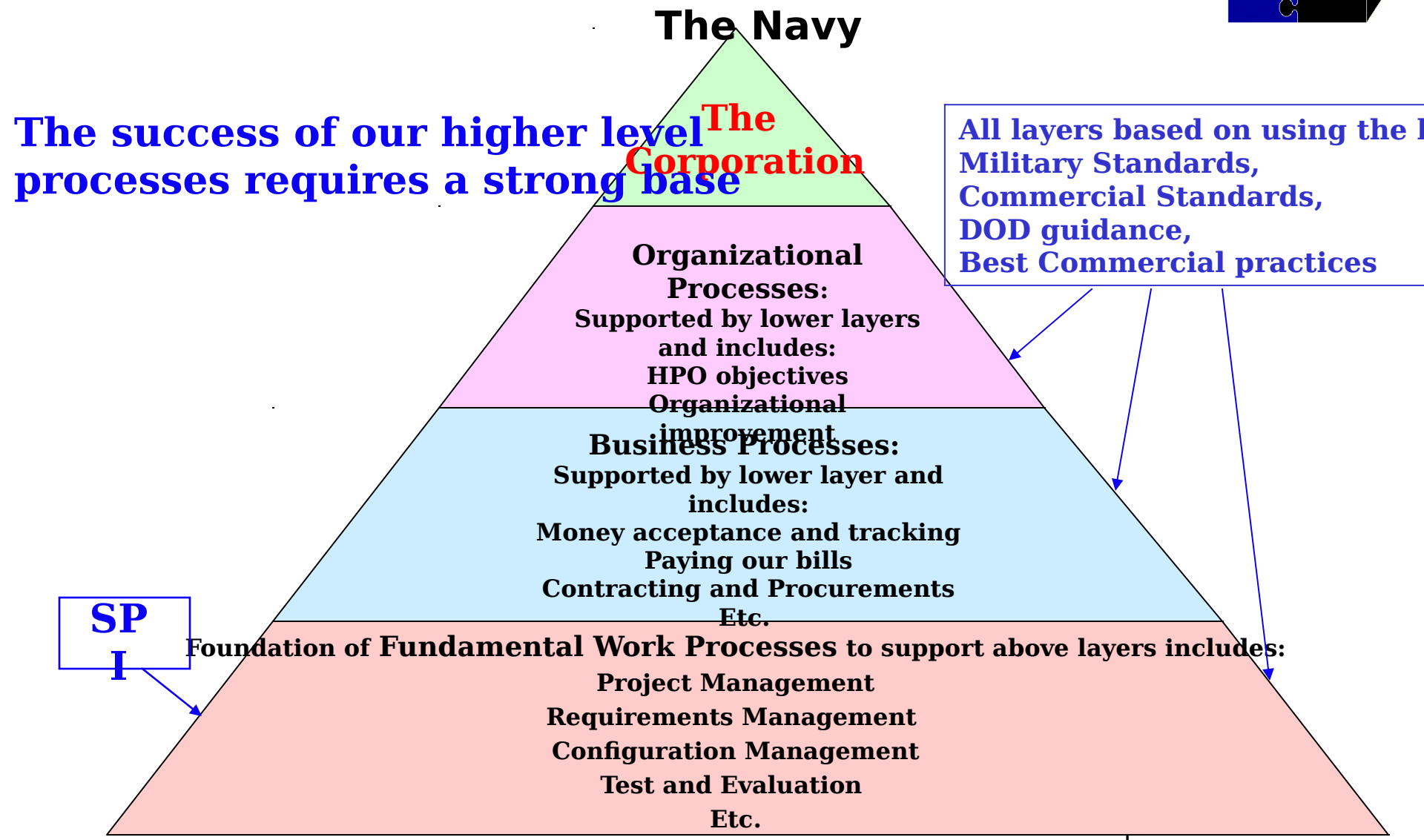


- **Started Software Process Improvement efforts in 1980s with the establishment of the Software Engineering Process Office**
- **November 1998, Executive Director established goal to achieve SW CMM Level 3; attained SW CMM Level 3 in Oct 2000**
- **SEPO refocused improvement efforts in 2000; changed the "S" in SEPO from Software to Systems**
  - **Initiating the Systems Process Improvement (SPI) Program through the integration of Systems and Software (3 years in the making)**
  - **Migrating to CMMI implementation for both Systems and Software**
  - **Will continue efforts to attain CMMI Level 5 for Software and Systems**
- **SEI's web page for the best practices for CMMI points to SEPO's web page: http://sepo.spawar.navy.mil**
- **Addressing recommendations of Defense Science Report of November 2000**
- **Achieved perfect score in GAO Report of March 2001 titled Summary of General Accounting Office Report to Congress on Software and Systems Process Improvement Programs Vary in Use of Best Practices**

SSC San Diego's Approach to SPI

a. **Fit into the culture: recognize SPI as part of a larger corporate process culture. SSC San Diego's Departments represent the various application domains and product lines of C4ISR, SSC San Diego is the organization**
b. **Engage sponsors and industry partners**
c. **Establish a SPI Policy which applies to all systems engineering projects at SSC San Diego**
d. **Select pilot/SPI projects from each Department to represent the critical business objectives of the Center; take a horizontal cut across the organization**
e. **Create a SPI organization: deputize SEPO (organizational level), SPI Agents (Department level), and SPI Leads (project level) as change agents**
f. **Develop a consistent approach; each Department approach tailored from the Center's organizational approach; continuously feeding back lessons learned in the SPI Projects to improve the Center's best practices**
g. **Assess SPI status; generate SPI Plans for the organization, Depts, SPI projects**
h. **Track progress against SPI Plans**
i. **Set performance objectives of project managers and practitioners to include process improvement; reward successes**
i. **Provide systems/software engineering training**
k. **Achieve CMM Level 3 capability on SPI projects**
l. **Migrate CMM Level 3 capability to other projects in a logical fashion**
m. **Transition to the CMMI and achieve Level 5**

SPI is a Part of a Corporate Process Improvement Culture

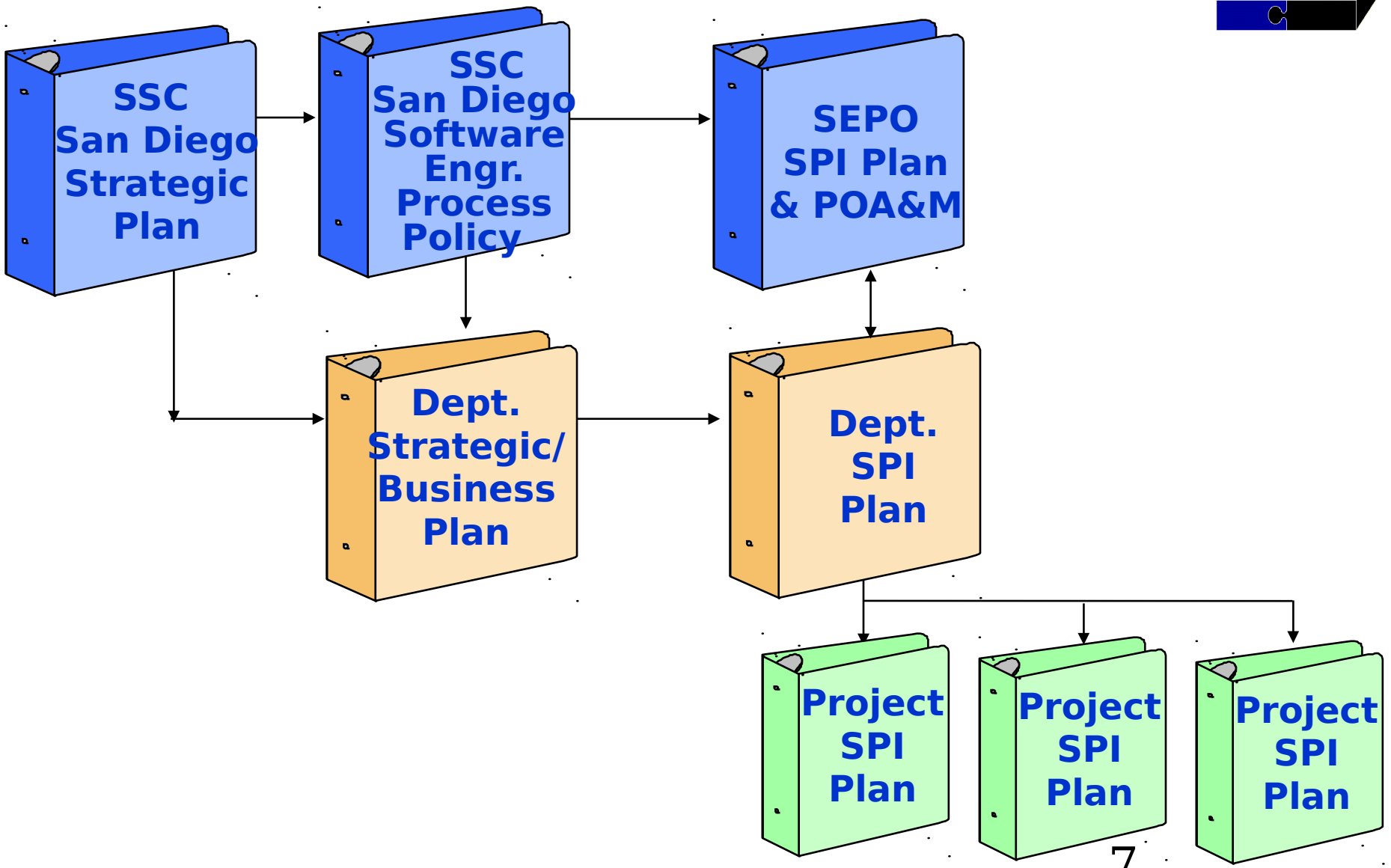


SSC San Diego Strategic Plan
Core Competencies

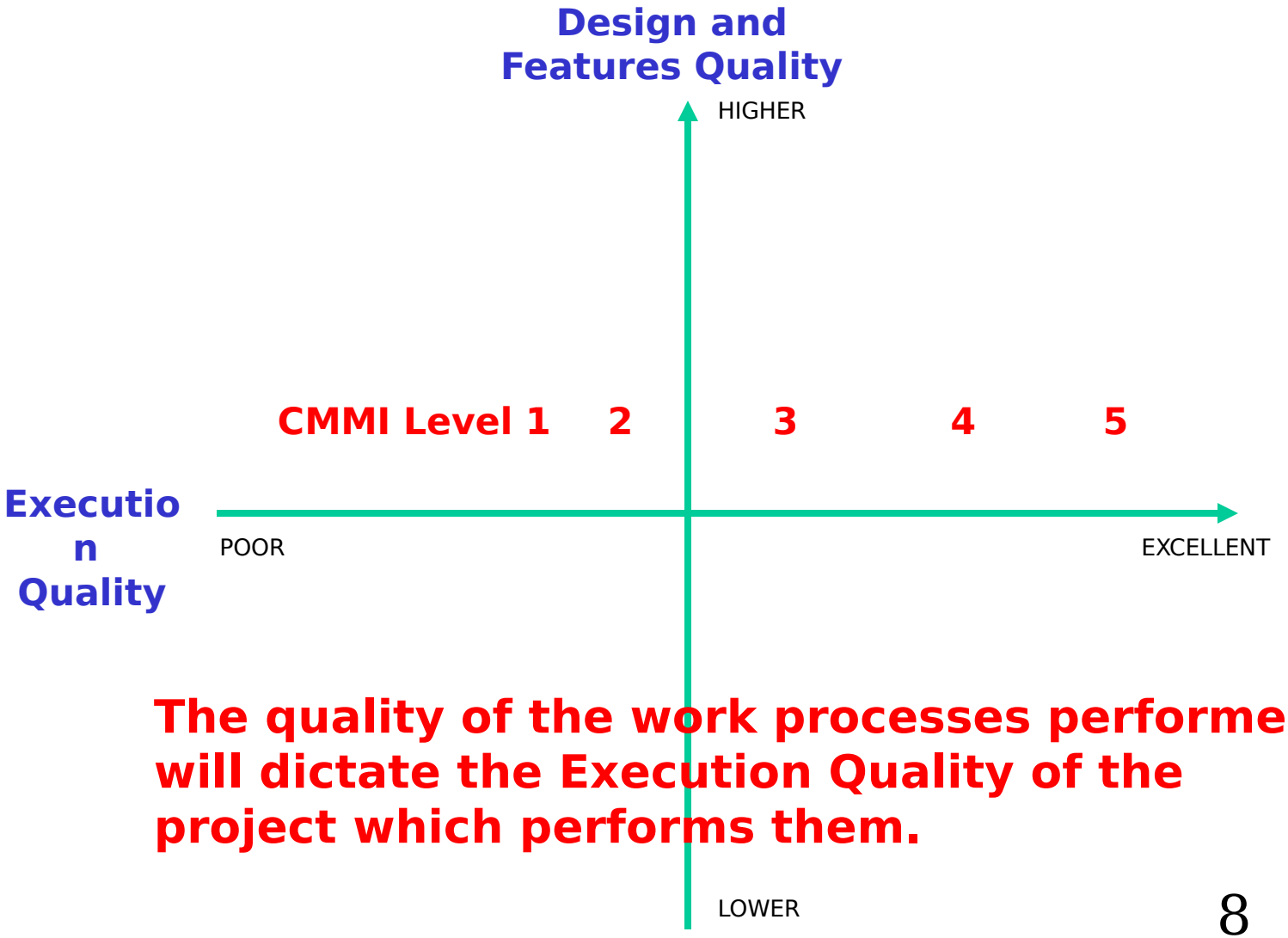
Invest SSC SD corporate resources in facilities, staff expertise (e.g., C4ISR), and work processes (e.g. systems engineering) focused toward continuously improving the quality of our products and services.

- **Identify the skills mix of employees we need to meet the organization's future needs. Determine the categories of employee we need to recruit and the training required to supplement their expertise.**
- **Develop facilities requirements and a corporate strategy that focuses on establishing SSC SD as a "World Class" technology development and engineering organization. The primary benefits of this is to achieve modern facilities, reduced infrastructure costs, and a motivating environment that will stimulate employee retention.**
- **Develop and implement Center-wide, integrated, technical work processes that consistently provide quality products and services to our customers on schedule and within budget (*focus on Systems and Software Engineering and Project Management*)**

Software Process Improvement Plans


SSC San Diego Strategic Plan
SSC San Diego Software Engr. Process Policy
SEPO SPI Plan & POA&M
Dept. Strategic/ Business Plan
Dept. SPI Plan
Project SPI Plan
Project SPI Plan
Project SPI Plan

How the CMM Fits into HPO



The quality of the work processes performed will dictate the Execution Quality of the project which performs them.

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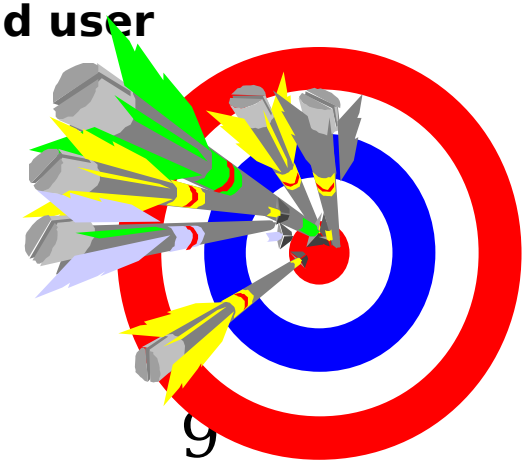
Systems Engineering Goals

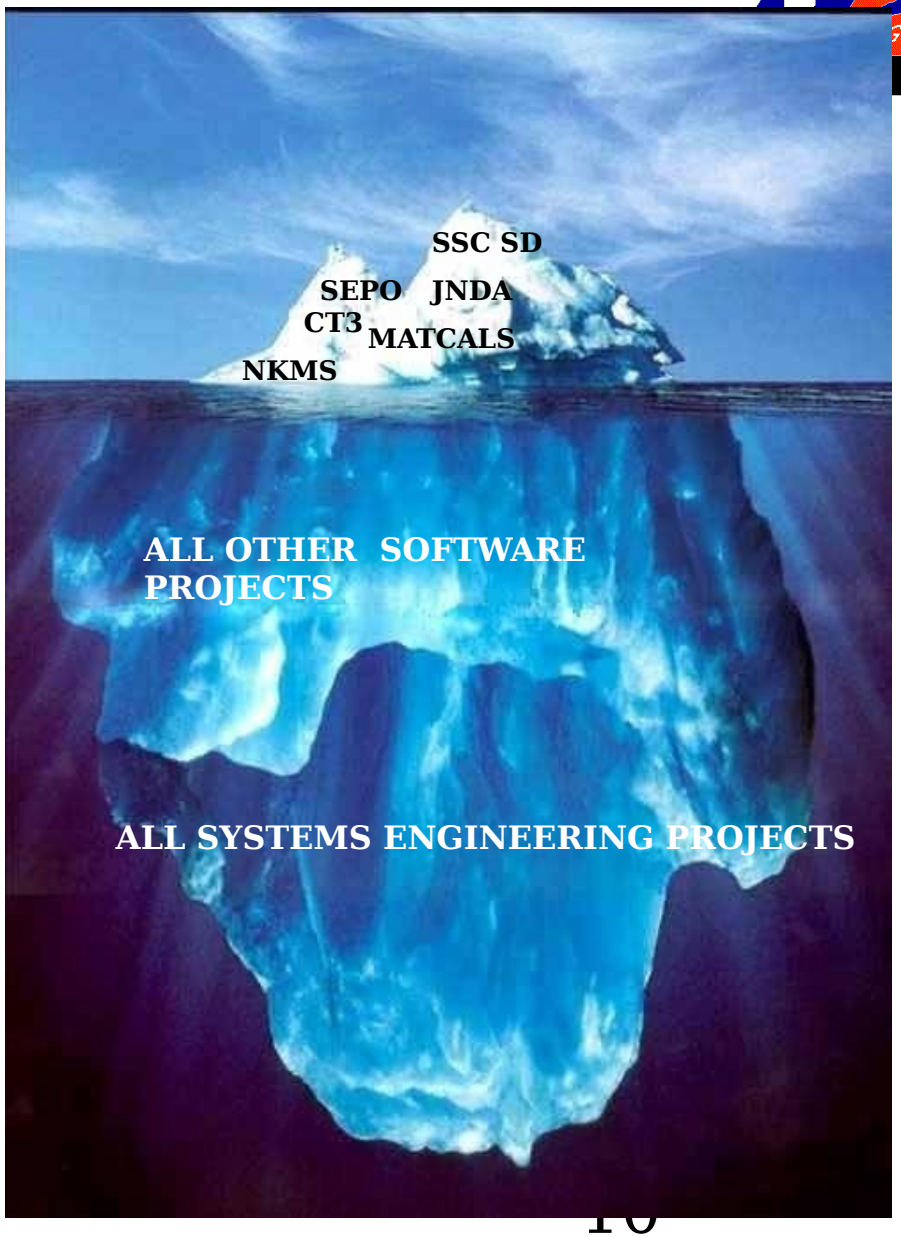
- **Achieve the systems engineering and project management capability defined through CMMI Level 3 as a milestone to CMMI Level 5; migrate SW-CMM Level 3 capability across Center software projects**
- **Produce quality systems in shorter development cycles**
- **Reduce the costs of supporting systems throughout the life cycle**
- **Rapidly introduce new technology into the product and the systems development process and achieve successful transitions**
- **Integrate software across traditional system boundaries to provide a composite set of capabilities to the end user**
- **Continuously improve customer satisfaction**
- **Continuously increase employee satisfaction**



SEPO Priorities

Attaining Software CMM Level 3 is only the tip of the iceberg!

1. **Sustainment of CMM Level 3**
2. **Migration of CMM Level 3**
3. **Transition to Systems Engineering via CMMI and achieve CMMI Level 3**
4. **Progression to CMMI Level 5**
5. **Engage the Sponsor and Industry Partners**



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SEPO's Priorities
1. Sustainment of CMM Level 3

- **Continue with everything already done to achieve CMM Level 3**
- **Perform periodic project reviews to know status, keep interest in SPI, and meet CMM Level 3 requirements**
- **Reward project managers and project personnel for implementing SPI**
- **Enhance project management skills by establishing a Project Management Core Competency**
- **Work with sponsors to accept SPI as best practice**

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1. Sustainment of CMM Level 3, con't
View of a Process Culture

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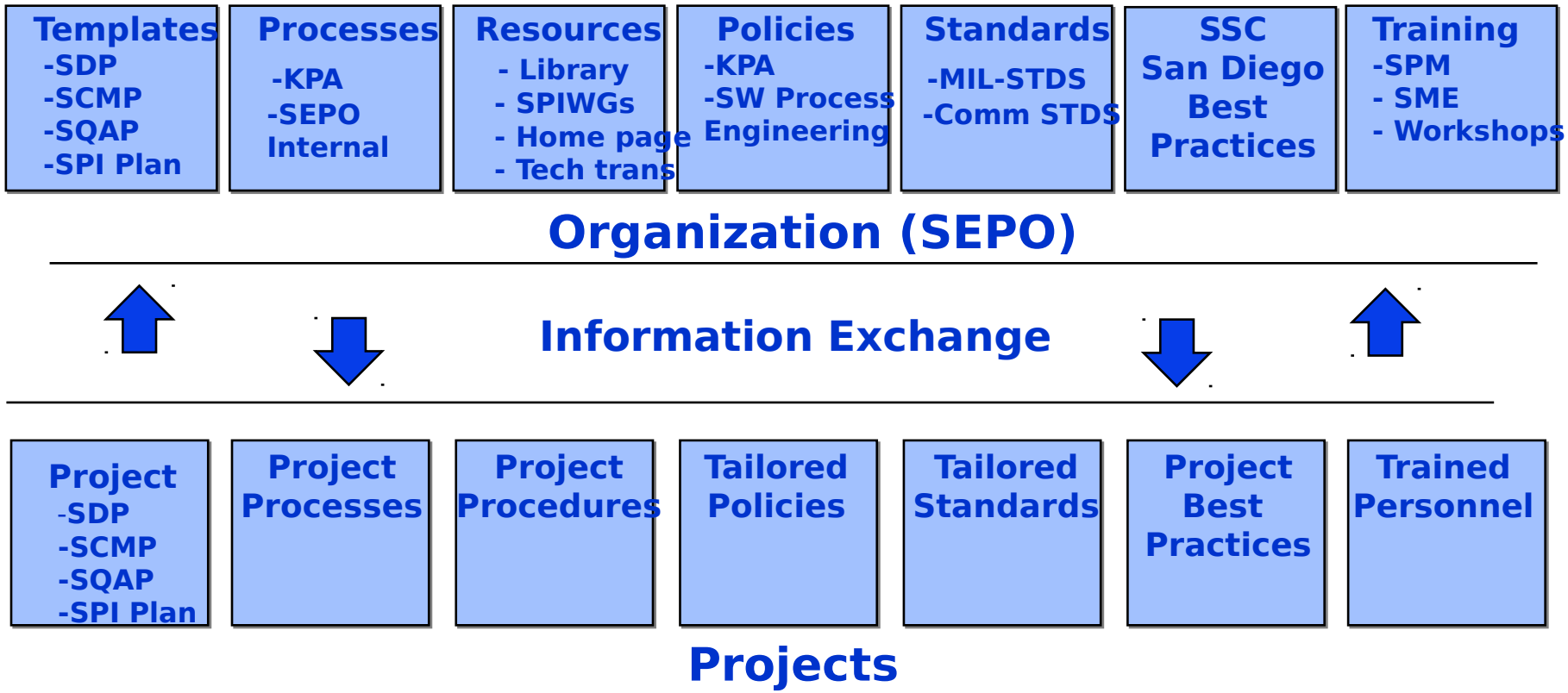
- **To achieve a CMM Level 3, an organization must institutionalize both organizational-level processes reflecting the organization's standard practices and project-level processes traceable back to the organizational level processes. Implement on SPI projects first, then migrate to all projects.**
- **Web-based Process Asset Libraries**



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1. Sustainment of CMM Level 3, con't

Key Reasons CMM Level 3 Happened

1. Management support and participation
2. SPI Pilot project efforts
3. Infrastructure: SEPO, SPI Agents, SPI Leads; no heroes, no tiger teams
4. SPI is a corporate approach, not by Department; use of SPI Projects across the organization
5. Training
6. Comprehensive process asset library
7. PDFs (project data forms); start of a measurement program
8. Lessons learned from external sources and other SCEs, conferences, committees, industry networking
9. SPI run as a project with plans and reviews, including the infamous stoplight charts
10. SCE preparation

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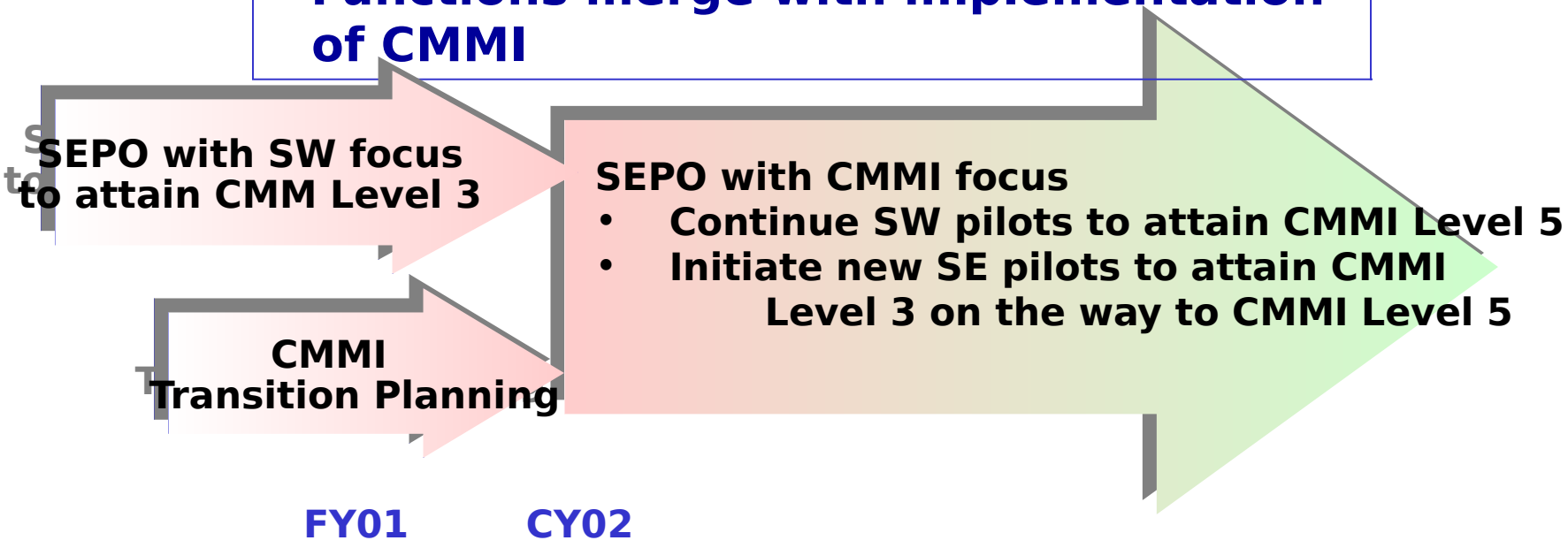
SEPO's Priorities
2. Migration of Software Level 3

- **Managers must continually ask projects what their plan is for getting to CMM Level 3**
- **Enforce the SSC San Diego Software Engineering Process Policy**
- **Reward project managers and project personnel for implementing SPI**
- **Enhance project management skills by establishing a Project Management Core Competency**
- **Work with sponsors to accept SPI as best practice; work with contractor team members to adopt best practices**
- **All new projects should be implementing CMM Level 3 processes**

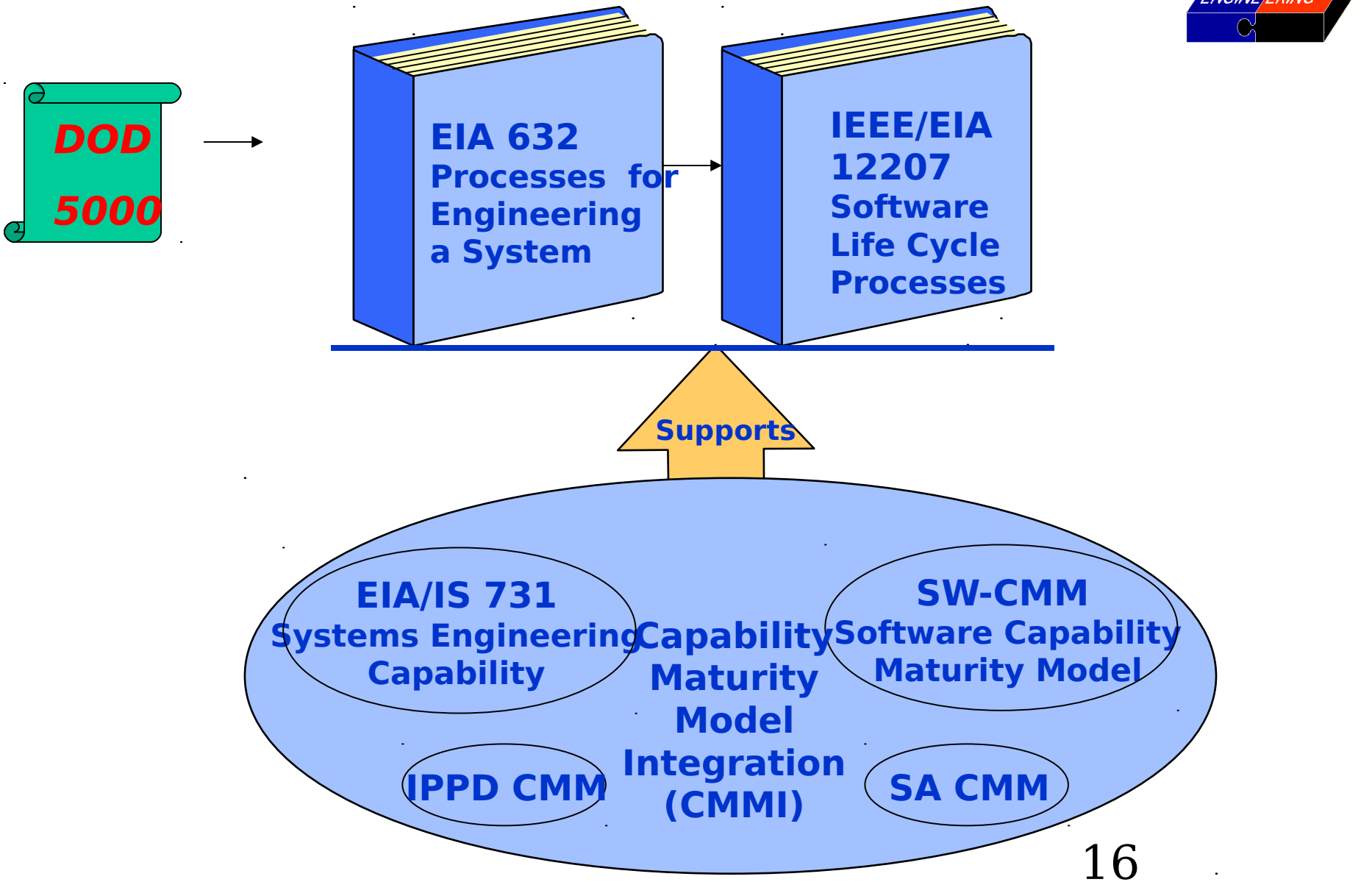
SEPO's Priorities
3. Transition to CMMI

* SW Eng & Sys Eng functions run in parallel
* Functions merge with implementation of CMMI


SEPO with SW focus
to attain CMM Level 3
CMMI
Transition Planning
SEPO with CMMI focus
• Continue SW pilots to attain CMMI Level 5
• Initiate new SE pilots to attain CMMI Level 3 on the way to CMMI Level 5
FY01
CY02

3. Transition to CMMI, con't

Transition to CMMI using Guidelines



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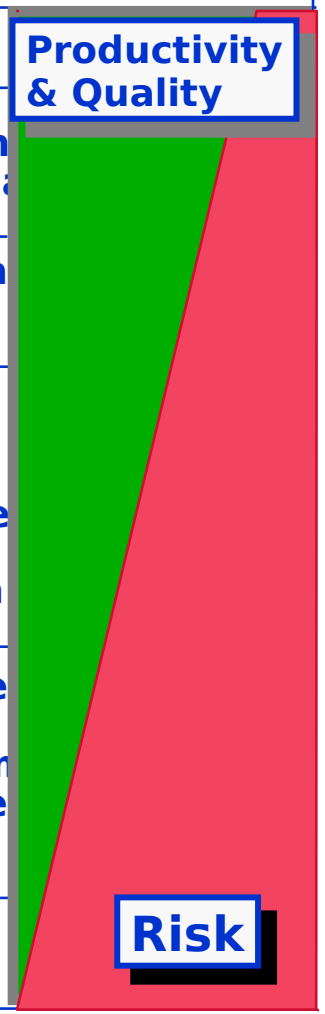
3. Transition to CMMI, con't
Why Standards and CMMs?

- **Standards such as EIA 632 and IEEE/EIA12207**
  - **Tell you what to do with respect to the processes for engineering system**
- **Capability Maturity Models (CMMs)**
  - **Give specific guidelines on how to do it better**
  - **Provides a capability model and assessment method to determine how well the processes in the standards are defined and implemented**
- **Implementation (how to do it) is up to each project**
  - **Training gives you the knowledge and methods to do it**
  - **SEPO provides Best Practices examples to follow on SSC San Diego Process Asset Library web page http://sepo.spawar.navy.mil**
  - **Projects must then decide how to tailor these Best Practices to their specific project issues and needs**

3. Transition to CMMI, con't

SEI Capability Maturity Model for Software

Level	Characteristic	Key Process Areas
Optimizing (5)	Continuous process capability improvement	Process change managem Technology change mana Defect prevention
Managed (4)	Product quality planning; tracking of measured software process	Software quality managem Quantitative process
Defined (3)	Software process defined and institutionalized to provide product quality control	Peer reviews Intergroup coordination Software product engineering Integrated software manageme Training program Organization process definition Organization process focus
Repeatable (2)	Management oversight and tracking project; stable planning and product baselines	Software configuration manage Software quality assurance Software subcontract managem Software project tracking & ove Software project planning Requirements management
Initial (1)	Ad hoc (success depends on heroes)	"People"



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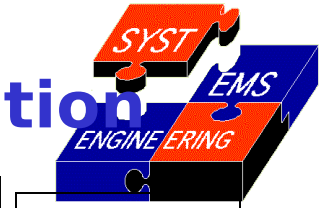
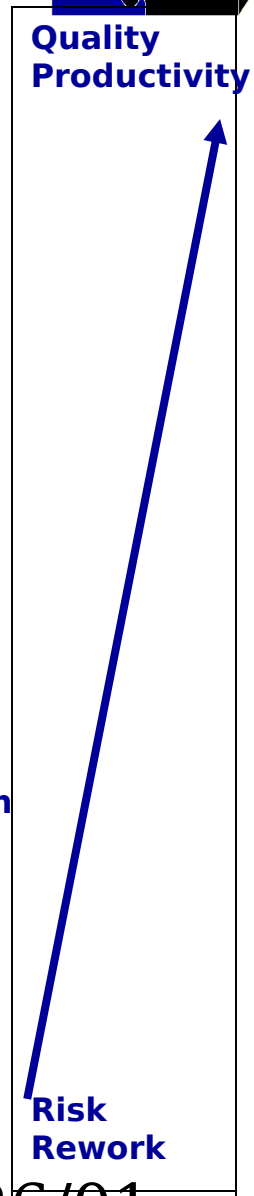
3. Transition to CMMI, con't

CMMI SE/SW/IPPD/A Staged Representation

Level	Focus	Process Areas
5 Optimizing	*Continuous Process Improvement*	Organizational Innovation and Deployment Causal Analysis and Resolution
4 Quantitatively Managed	*Quantitative Management*	Organizational Process Performance Quantitative Project Management Quantitative Supplier Management
3 Defined	*Process Standardization*	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organizational Process Definition Organizational Training Integrated Project Management Integrated Supplier Management Risk Management Decision Analysis and Resolution Organizational Environment for Integration Integrated Teaming
2 Managed	*Basic Project Management*	Requirements Management Project Planning Project Monitoring and Control Supplier Selection and Monitoring Measurement and Analysis Process and Product Quality Assurance Configuration Management
1 Initial		





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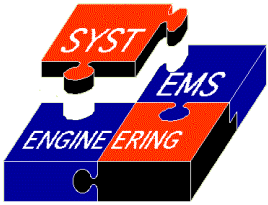
3. Transition to CMMI, con't
Strategy to Transition to CMMI



- **Develop POA&M for upfront work needed in order to develop implementation/transition plan**
  - **Establish 2 person transition office**
  - **Learn EIA 632/CMMI**
  - **Investigate lessons learned from other organizations**
  - **Model selection: staged**
  - **SEPO Training**
- **Develop implementation/transition plan (WBS, schedule, resources, risks) and integrate with current Software SPI Action Plan:**
  - **Gap analysis**
  - **Update current processes and SSC San Diego Process Asset Library (web page)**
  - **Establish SE baseline across Center**
  - **Adjust the infrastructure; determine which current SPI Agents are right people or do we need others**
  - **Choose Pilot Projects in each Department**
  - **Engage Supply/Contracts Division**
  - **Determine training requirements for both SPI Agents and Center personnel**
  - **Recommend key metrics for tracking process improvement, performance, and project progress**
- **Gain Awareness and Acceptance**
  - **Publicize (Outlook articles, all hands emails, status briefs, etc)**
  - **Engage sponsor and industry partners**
  - **Update SE Policy; establish demand function**
  - **SE Overview brief to every Department**

SEPO's Priorities
4. Progression to CMMI Level 5

- **What are Levels 4 and 5**

  - Application of Statistical Process Control (SPC) to software development (Deming)

  - Defect prevention

  - Use of technology insertion to improve the process and product

  - Continuous process improvement

- **Cannot attain CMMI L4 and 5 without more projects participating in the SPI initiative and contributing metrics**
- **Train Center employees in Statistical Process Control (SPC)**
- **Provide Center-level funding for an automated metrics database**
- **Reward project managers and project personnel for implementing SPI**
- **Work with sponsors to accept SPI as best practice; work with contractor team members to adopt best practices**
- **Five of six companies reaching Level 4 or above employed Sigma 6 trained leaders, the remaining successful company was lead by a person with a degree in Statistics**
- **Implement the People CMM (addresses workforce goals of the Corporation)**
  - **John Vu of (Boeing) "….can't get to Level 5 without being P-CMM Level 3**

SEPO's Priorities
5. Engage the Sponsor and Industry Partners

- **Corporate collaboration needed!**
- **Capitalize on SPAWAR Strategic Planning Off-site results**
  - **….”getting our arms around SPAWAR's processes is the key to our long term success.”**
- **Participate in SPAWAR Working Group for Processes**
- **Use DoD 5000 and the results of DSB and GAO Reports to heighten awareness and motivate staying in concert with DoD and other Navy Syscoms**
- **Share info on the Why a Process Focus and ROI sections of the SE Overview Brief**
- **Introduce SPAWAR to CMM for Acquisition**
- **Invite to attend SEPO training courses, continue to provide HPO training**
- **Invite industry leaders to speak with senior managers in claimancy**
- **SEPO briefs to SPAWAR leaders, PMWs, and industry**
- **Share the SSC San Diego Process Asset Library (http://sepo.spawar.navy.mil)**
- **Assign a SPAWAR SPI Agent to interface with SEPO**
- **Give guidance to our projects on how to deal with feeling compelled to accept unrealistic schedules and budgets (project mangers want to know what to do; can they ever turn down work?)**
  - **Every “proposal” from every project should have a GOOD estimate of cost, schedule, and performance requirements and a Risk Plan for dealing with accepting less**

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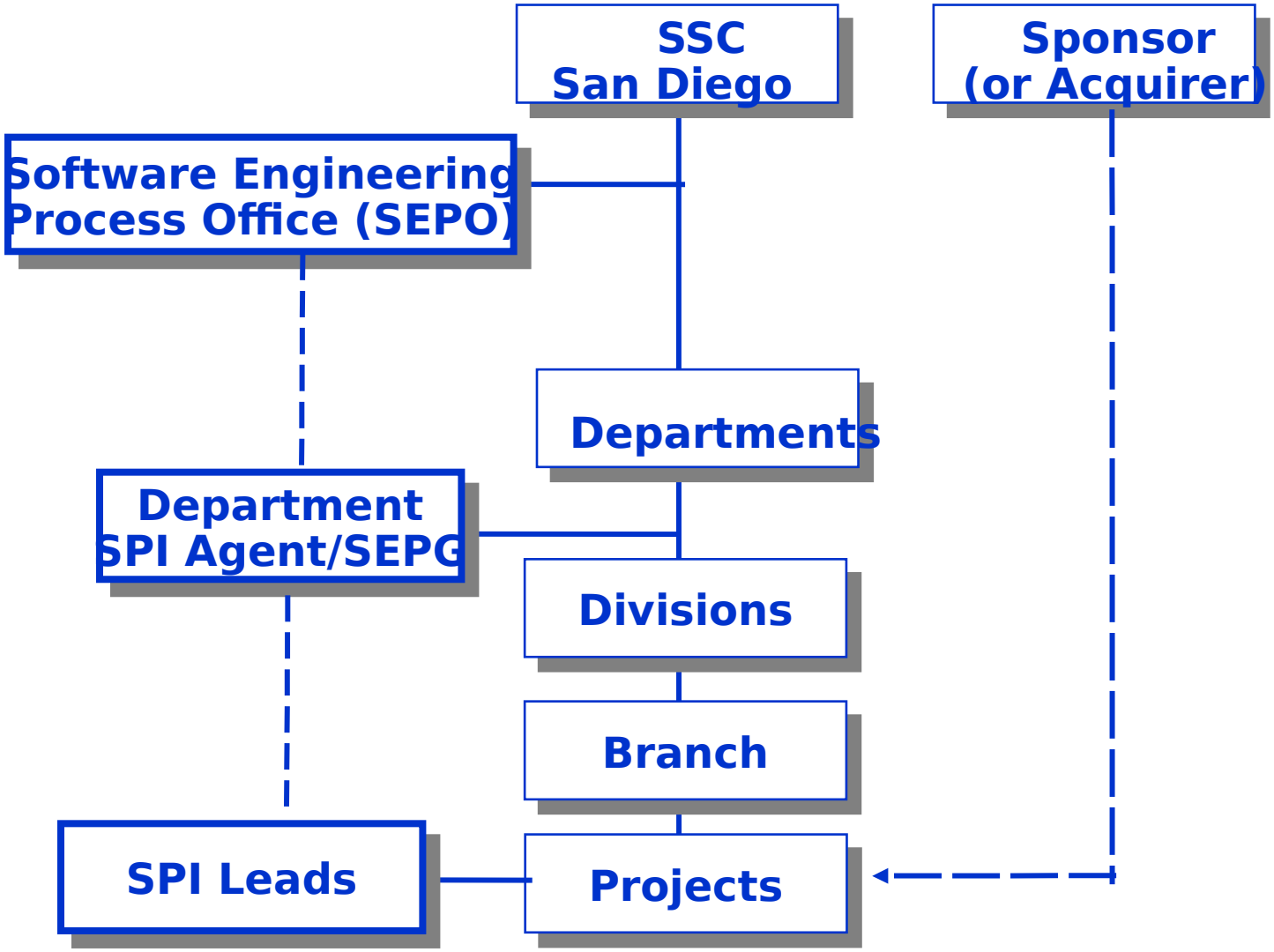
Key Points

- **The Standards and CMMI Process Areas apply to all projects**
  - **Regardless of size**
  - **Regardless of budget**
  - **Regardless of project scope or life cycle phase**

- **Each project must tailor the organization's Best Practices for their own use; tailoring is based on the user's professional judgement and tailoring guidelines**

The Systems Engineering Organization



Systems Engineering Organization, con't